

3DShape2VecSet: A 3D Shape Representation for Neural Fields and Generative Diffusion Models

Year: 2023 | Citations: 319 | Authors: Biao Zhang, Jiapeng Tang, M. Nießner, Peter Wonka

Abstract

We introduce 3DShape2VecSet, a novel shape representation for neural fields designed for generative diffusion models. Our shape representation can encode 3D shapes given as surface models or point clouds, and represents them as neural fields. The concept of neural fields has previously been combined with a global latent vector, a regular grid of latent vectors, or an irregular grid of latent vectors. Our new representation encodes neural fields on top of a set of vectors. We draw from multiple concepts, such as the radial basis function representation, and the cross attention and self-attention function, to design a learnable representation that is especially suitable for processing with transformers. Our results show improved performance in 3D shape encoding and 3D shape generative modeling tasks. We demonstrate a wide variety of generative applications: unconditioned generation, category-conditioned generation, text-conditioned generation, point-cloud completion, and image-conditioned generation. Code: <https://1zb.github.io/3DShape2VecSet/>.